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**H01L**

(54) **Trichromatic colour filter comprising a substituted phthalocyanine**

(57) A trichromatic colour filter, suitable for use in a flat bed display, has a green pigment which is an optionally substituted octa-4,5-phthalocyanine, e.g. copper octa-4,5-phenyl-phthalocyanine. The colour filter may be prepared on a substrate e.g. an amorphous silicon thin film transistor.

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## SPECIFICATION

## Colour filter

5 This specification describes an invention relating to trichromatic colour filters suitable for use in flat bed displays incorporating red, blue and green pigments and more particularly to a colour filter in which the green pigment is a substituted phthalocyanine.

10 A green pigment for use in flat bed displays preferably has a transmission maximum, with a transmittance of at least 50%, and more preferably at least 70%, centred on  $530 \pm 20\text{m}\mu\text{m}$  and a reasonably narrow band width i.e. preferably not greater than 15  $250\text{m}\mu\text{m}$  and more preferably not greater than  $150\text{m}\mu\text{m}$  at 50% of peak height when deposited in a thin layer on a suitable substrate.

According to the present invention there is provided a trichromatic colour filter suitable for use in a flat bed display in which the green pigment is an optionally substituted octa-4,5-phthalocyanine.

The OPPc may be substituted in the phenyl rings or the phthalocyanine nucleus. Preferred substituents on the phenyl rings are non-ionic groups, such as halogeno, alkyl, alkoxy, amino and substituted amino, hydroxy and nitro in which the alkyl groups are preferably  $\text{C}_{1-20}$ -alkyl. Preferred substituents for the phthalocyanine nucleus are, alkyl, especially  $\text{C}_{1-20}$ -alkyl, such substituents being present in the 3 or 6 position or both the 3 and 6 positions on each of the peripheral benzene rings of the phthalocyanine nucleus.

The OPPc may be metal-free or it may be complexed with a metal or oxy-metal derivative. Examples of suitable metals are Zn, GaOH, VO, Ni, Pd, Pb, Mg, Ca, Co and especially Cu.

An especially preferred pigment is copper octa-4,5-phenyl-phthalocyanine which has a symmetrical transmission peak at  $530\text{m}\mu\text{m}$  with a transmittance, substantially independent of layer thickness up to  $1\mu\text{m}$ , of at least 90%.

The OPPc may be prepared from the corresponding 4,5-diphenylphthalic anhydride by reaction with urea in an inert solvent in the presence of cupric chloride and methods for the preparation of the starting material are given in UK 683770.

The colour filter can be prepared in the usual manner for such devices by sequential application of the red, blue and green pigments to a suitable substrate such as an amorphous silicon thin film transistor. In order to obtain arrays of small dots of the three pigments over the surface of the substrate it is convenient to employ a photolithographic technique whereby each pigment is deposited on a photo-etched polymer surface and the pigment and polymer are removed from the un-irradiated areas by washing with a solvent.

The invention is further illustrated by the following Example.

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*Example*

A layer of the green pigment, copper octa-4,5-phenyl-phthalocyanine, at a thickness of  $0.1\mu\text{m}$ , was formed on a glass plate by vacuum evaporation. The pigment evaporated satisfactorily and deposited in a

layer of substantially even thickness on the glass plate.

The transmission spectrum of the layer, plotted with a spectrophotometer, had a transmission peak of 95% at  $530\text{m}\mu\text{m}$  with a band width at 50% peak height of  $200\text{m}\mu\text{m}$ .

The layers of pigment were substantially resistant to washing with a solvent comprising a mixture of iso-propanol and methylisobutylketone.

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## CLAIMS

1. A trichromatic colour filter suitable for use in a flat bed display in which the green pigment is an optionally substituted octa-4,5-phthalocyanine.

2. A filter according to claim 1 wherein the pigment is copper octa-4,5-phenylphthalocyanine.

3. A filter as claimed in claim 1 substantially as hereinbefore described with reference to the Example.

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